of the same mass present also the square arrangement, and accordingly certain portions of it exhibit the octohedral group.

The author remarks, in support of this theory, that a large proportion of those substances which assume the octohedral form, are considered by chemists as simple bodies, and are therefore more likely to have the simple form of spheres than such as consist of more than one element. Since the supposition of spherical particles appeared to him to afford so satisfactory an explanation of an acknowledged difficulty in crystallography, he was led to consider what other forms would result from the union of solids most nearly allied to spheres; and he observed that obtuse rhomboids, like those of carbonate of lime and other substances, would be formed by the union of oblate spheroids, as indeed Huyghens had long since observed; and that by the union of oblong spheroids, the natural result would be triangular and hexangular prisms, as are found in beryl and phosphate of lime.

But the most singular arrangement noticed, is that which affords an explanation of the origin of cubes in crystallography. These, he supposes, may consist of spherical particles, of two different kinds, regularly intermixed in equal numbers (in conformity to the most recent views of binary combination in chemistry); for these, he observes, will not tend, as before, to the octohedral arrangement, but will be perfectly in equilibrio when every group of eight balls composes a cube, according to the most obvious course of alternation of the two elements. For in that case all similar balls will be equidistant from each other, and will also be equally distant from all adjacent balls of the opposite denomination.

In a note are subjoined some observations on a theory of crystallization proposed by M. Prechtl, who imagines that a mass of soft spheres may all be compressed into tetrahedra, which is demonstrably impossible. That by another degree of softness or of attraction, spheres, each surrounded by five others, may be compressed into triangular prisms, without regard to the different degree of compression that must take place in the direction of the axis; that other spheres again less compressible than before, and consequently surrounded by as many as six others, may be formed into cubes, which indeed is admitted to be a very possible supposition.

It is observed, however, that M. Prechtl denied that a sphere can be surrounded by more than six, although, in fact, the most probable supposition is, that each soft sphere would be surrounded by twice that number, and would form a mass of regular dodecahedra.

On a Substance from the Elm Tree, called Ulmin. *By* James Smithson, *Esq. F.R.S.* Read December 10, 1812. [*Phil. Trans.* 1813, *p.* 64.]

The substance here examined by the author, we are told, was first made known by the celebrated Klaproth. It has been ranked as a distinct principle, soluble in water, but insoluble in alcohol or ether, and convertible, by the action of nitric or oxymuriatic acids, into a

resinous matter no longer soluble in water, but now rendered soluble in alcohol, by a supposed union with oxygen derived from these acids.

Mr. Smithson being in possession of ulmin, sent to him from Palermo by the same person who had furnished M. Klaproth with the subject of his researches, has made various experiments, which lead to a different opinion of its nature from that which has been entertained.

When ulmin is dissolved in water, a dilute solution is yellow; but when concentrated, it is of a dark red, like blood. This solution slowly and feebly restores the colour of turnsol, after it has been reddened by an acid. Most acids occasion a copious precipitate from this solution of the matter which has been considered as resin. The solution, however, still retains a slight yellow colour, from a small quantity of this matter which remains dissolved. By evaporation of the solution a salt is obtained, consisting of potash combined with the acid employed in the experiment; and the quantity of potash, by various trials, amounted to about one fifth part of the weight of the ulmin.

The precipitate, when dried, is very glossy, and has a resinous appearance. In minute fragments it is found to be transparent, and of a deep garnet colour. It burns with flame, and is reduced to a white ash.

Alcohol does dissolve it, but very sparingly.

Water also dissolves a small quantity, and the solution seems to redden turnsol. Neither ammonia nor carbonate of soda promote its solution in water; but a small quantity of potash dissolves it immediately, and abundantly, and appears to regenerate ulmin, with all its original properties.

Hence Mr. Smithson infers, that ulmin is not a simple vegetable principle of anomalous qualities, but a combination of potash, with a matter more nearly allied to the extractives than to the resins.

The author has also investigated the properties of a substance obtained from the elm-tree in this country, which differed from that of Palermo in containing a redundant quantity of potash in the state of carbonate. He also made experiments on the sap of the elm-tree, from which, however, he did not succeed in obtaining ulmin.

On a Method of Freezing at a distance. *By* William Hyde Wollaston, *M.D. Sec. R.S.* Read December 17, 1812. [*Phil. Trans.* 1813, *p.* 71.]

The method here described by the author, is performed by means of an instrument, to which he gives the name of Cryophorus, expressing its office of frost-bearer. It consists of a tube, which may be two or three feet long, or even more, terminated by a ball at each end. One of these balls contains a small quantity of water to be frozen, and the rest of the instrument is as complete a vacuum as can be obtained.

In making this instrument, one of the balls terminates in a capillary